

in said etching chamber;

an evacuation system which evacuates said etching chamber by an evacuation system;

an etching gas supply which supplies an etching gas into said etching chamber;

a plasma generator which generates a plasma for performing etching of said sample in said etching chamber; and

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a temperature controller which circulates a heat exchanging medium through the interior of said exchangeable jacket during etching so as to at least control a temperature of a surface of said exchangeable jacket which faces the plasma in said etching chamber within a predetermined range and enables depositing of a coating layer on the surface of said exchangeable jacket during etching which prevents the surface of said exchangeable jacket from being etched by said plasma.

22. A plasma etching apparatus according to claim 21, wherein said temperature controller circulates said heat exchanging medium so as to control the temperature of the surface of said exchangeable jacket in a range of 0 to 50°C.

23. A plasma etching apparatus according to claim 21, wherein the coating layer is deposited up to a maximum thickness which does not peel off during etching of the

sample.

540 24. A plasma etching apparatus according to claim 23,
wherein the maximum thickness of the coating layer includes a
thickness of 200 microns.

25. A plasma etching apparatus according to claim 21,
wherein the heat exchanging medium is a refrigerant.

26. A plasma etching apparatus for etching a sample
comprising:

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an etching chamber having the sidewall;
an exchangeable jacket for protecting the sidewall of the
etching chamber;
a sample holder which holds a sample to be etched within
the etching chamber;
means for generating a plasma and for etching the sample
within the etching chamber; and
means for preventing etching of a surface of the
exchangeable jacket which is held inside of the sidewall of
the etching chamber and faces the plasma during etching of the
sample by depositing a coating film on the surface of the
exchangeable jacket facing the plasma during etching of the
sample.

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27. A plasma etching apparatus according to claim 26, wherein the means for preventing etching of the surface of the exchangeable jacket includes a temperature controller which circulates a heat exchanging medium through the interior of said exchangeable jacket during etching of the sample so as to at least control a temperature of the surface of said exchangeable jacket which faces the plasma in said etching chamber within a predetermined range.

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28. A plasma etching apparatus according to claim 27, wherein said temperature controller circulates said heat exchanging medium so as to control the temperature of the surface of said exchangeable jacket in a range of 0 to 50°C.

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29. A plasma etching apparatus according to claim 27, wherein the coating layer is deposited up to a maximum thickness which does not peel off during etching of the sample.

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30. A plasma etching apparatus according to claim 28, wherein the maximum thickness of the coating layer includes a thickness of 200 microns.

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31. A plasma etching apparatus according to claim 27, wherein the heat exchanging medium is a refrigerant.--